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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/790,652	03/01/2004	Tue Nguyen	TEGL-01162US1	9765
23910	7590	03/20/2006	EXAMINER	
FLIESLER MEYER, LLP FOUR EMBARCADERO CENTER SUITE 400 SAN FRANCISCO, CA 94111			NGUYEN, HA T	
			ART UNIT	PAPER NUMBER
			2812	

DATE MAILED: 03/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/790,652

Applicant(s)

NGUYEN ET AL.

Examiner

Ha T. Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 January 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-66 is/are pending in the application.
- 4a) Of the above claim(s) 19,21,22 and 36-66 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18,20 and 23-35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 3-1-4 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Notice to applicant

1. Applicant's election without traverse of the first embodiment, claims 1-18, 20, and 23-35 in the Paper filed on 01-11-06 is acknowledged.

Claim Objections

2. Claims 6, 15, and 17 are objected to because of the following informalities: claim 6 is the duplicate of claim 5, and claim 15 depends from itself. In claim 17, line 2, substitution of "reactants" with - - reactant- - is suggested for correctness. Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 23-25 are rejected under 35 U.S.C. 102(e) as being anticipated by Li (USPN 6613656).

Li discloses [Re claim 23] an improved process to deposit a thin film on a substrate, the improvement comprising successively depositing a plurality of layers made of at least one reactant selected from the group consisting of metal organic, organic, metal, metal nitride, and metal oxide, with each of said layers being greater than one atomic layer thick; [Re claim 24] an improved method of thin film processing, the improvement comprising depositing multiple atomic layers for each exposure to a reactant for high throughput processing (see col. 6, lines 7-14, col. 7, lines 22-30) ; and

[Re claim 25] an improved method for thin film processing, the improvement comprising using nano-layer deposition to create a nanocrystalline grain structure in an amorphous matrix (see Figs. 6, 8 and col. 8, lines 15-20). The examiner interpreted that as deposited, the film formed is amorphous due to formation of nanocrystalline grains formed on each nucleus of the uniform nucleation layer.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103 and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1-4, 8-13, 16-18, 27-28, and 31-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li.

Referring to Fig. 3 and related text, Li discloses [Re claim 1] a process to deposit a thin film on a device by chemical vapor deposition, comprising: (a) exposing the device to a gaseous first reactant, wherein the first reactant deposits on the device to form a first layer that can be other than a monolayer (see col. 6, lines 7-45); (b) performing a plasma treatment on the deposited film; (c) exposing the device, with the first layer deposited, to a gaseous second reactant under the plasma treatment to deposit the gaseous second reactant (see col. 5, lines 26-

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34), the examiner interpreted that when the second reactant is introduced using a plasma, this plasma simultaneously performing a plasma treatment of the deposited film; and (d) repeating steps (a) and (c) until the thin film, comprising a plurality of layers, is deposited (see col. 5, lines 66-col. 7, line 30). But it fails to disclose expressly all the features in the same process. However, at the time of the invention, it would have been obvious for a person of ordinary skill to modify Li' s teaching to use plasma with the second reactant to reduce reaction temperature.

[Re claim 18] Li discloses a process to deposit a thin film by chemical vapor deposition, comprising: (a) pre-cleaning a surface of a device; (b) evacuating a chamber of gases (see par. bridging cols 5-6), the examiner interpreted that the purging at lower pressure removes contaminants loosely attached to the surface of the device and rids the chamber of undesirable gases, which do not take part in the film forming process; (c) exposing the device to a gaseous first reactant in the chamber, wherein the first reactant deposits on the device to form a layer having a thickness of other than a monolayer; (d) evacuating the chamber of gases; (e) striking a plasma; (f) exposing the device, coated with the first reactant, to a gaseous second reactant under the plasma so that the layer deposited by the first reactant is treated; and (g) repeating steps (c)-(f) until the thin film comprising a plurality of layers is deposited (see col. 5, lines 25-col. 7, line 30). The examiner interpreted that in the case where plasma is used for the second reactant, plasma would be strike before the introduction of the second reactant.

[Re claim 27] Li discloses a method for processing a thin film onto a semiconductor wafer (see col. 3, lines 50-65), the method comprising: exposing a wafer in a chamber with a first gaseous reactant; coating the wafer with the first reactant so that a first coat of the first reactant is greater than one monolayer in thickness (see col. 6, lines 7-45); evacuating the chamber (see col. 7, lines 4-100; exposing the coated wafer to a gaseous second reactant as a plasma (see col. 5, lines 26-34) ; and forming a second coat over the first coat, the second coat being greater than one monolayer in thickness (see col. 6, lines 42-64). But it fails to disclose expressly all the features in the same process. However, at the time of the invention, it would have been obvious for a person of ordinary skill to modify Li' s teaching to use plasma with the second reactant to reduce reaction temperature.

[Re claim 2] Li discloses wherein the device is a wafer (see col. 3, lines 50-65);

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[Re claim 3] wherein the plasma treatment is capable of at least one of enhancing and maintaining at least one of conformality and density of the thin film (see col. 5, lines 26-34 and col. 6, lines 55-640;

[Re claim 8] Li discloses wherein the thin film comprises a metal film (see col. 6, lines 7-14).

[Re claims 4, 10- 11 and 31-32] Li fails to disclose wherein the plasma is a high density plasma with greater than 5×10^9 ion/cm³ or wherein exposing the device, with the first layer deposited, to the second reactant occurs under pressure above one hundred millitorr (100 mT); pressurizing the chamber to a pressure above one hundred millitorr (100 mT). However any variation in ion density or pressure in the present claims is obvious in light of the cited art, because the changes in ion density or pressure produce no unexpected function. The routine varying of parameters to produce expected changes are within the ability of one of ordinary skill in the art. Patentability over the prior art will only occur if the parameter variation produces an unexpected result. *In re Aller*, Lacey and Hall, 105 U.S.P.Q. 233, 235. *In re Reese* 129 U.S.P.Q. 402, 406.

[Re claims 9 and 12] Li discloses wherein the thin film is selected from the group consisting of a metal nitride film and a metal oxide film; wherein reacting the first reactant and second reactant creates a new compound (see col. 7, lines 30-65). The examiner interpreted that the product of the reaction would be a metal nitride or a metal oxide deriving from the metal containing first reactant depending on the nitrogen or oxygen containing gas used as the second reactant ;

[Re claim 13] wherein the thin film thickness is between a fraction of a nanometer and ten nanometers (see col. 7, lines 23-29);

[Re claim 16] sequentially pulsing the plasma for each layer to be deposited (see col. 5, lines 26-34), the examiner interpreted that this limitation is met when plasma is used for each reactant to reduce reaction temperature;

[Re claim 17] purging a chamber of the first reactants (see col. 7, line 41-48);

[Re claim 28] wherein the method further comprises successively adding at least one additional coat by repeating the evacuating step, the second exposing step, and the forming step; [Re claim 33] wherein the second exposing step and subsequent forming step further comprise

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reacting the first coat of the first reactant with the second coat of the second reactant to form a different chemical product (see col. 7, lines 31-65). The examiner interpreted that the product of the reaction would be a nitride or an oxide deriving from the first reactant depending on the nitrogen or oxygen containing gas used as the second reactant.

[Re claim 34] Li discloses wherein the method is unaffected by self-limiting surface reactions of the first coat and second coat; and [Re claim 35] wherein the method is unaffected by self-limiting surface reactions of the first coat, the second coat, and the at least one additional coat (see col. 6, lines 42-64).

7. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li, as applied above, in view of Soininen et al.(USPN , hereinafter "Soininen").

Li discloses substantially the limitations of claims 5-7, as shown above.

But it fails to disclose expressly the use of metal organic reactant.

However, the missing limitation is well known in the art because Soininen discloses this feature (See pars. 89-103).

A person of ordinary skill is motivated to modify Li with Soininen to obtain thin film at lower temperature.

Therefore, it would have been obvious to combine Li with Soininen to obtain the invention as specified in claims 5-7.

8. Claims 14 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li, as applied to claim 1 above, in view of Pinneo (USPN 5902563).

[Re claim 14] Li discloses substantially the limitations of claims 14, as shown above. But it fails to disclose expressly exciting the plasma with a solid state RF plasma source. However, the missing limitation is well known in the art because Pinneo discloses that solid state RF plasma generator is conventionally used in the art (See col. 9, lines 49-61). A person of ordinary skill is motivated to use Pinneo's solid state RF plasma source in the process of Li to efficiently used equipment readily available and well-proven.

[Re claim 29] In a similar manner, the combined teaching of Li and Pinneo discloses wherein the method further comprises exciting the plasma with a solid state RF plasma source functionally associated with the chamber (see Pinneo, col. 9, lines 13-61).

Therefore, at the time of the invention it would have been obvious to combine Li with Pinneo to obtain the invention as specified in claims 14 and 29.

9. Claims 15, 20 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li in view of Pinneo, as applied to claim 14 above, and further in view of Flamm et al. (USPN 4918031), (Note: the examiner considered claim 15 to depend from claim 14).

The combined teaching of Li and Pinneo discloses substantially the limitations of claims 15, 20 and 30, as shown above. But it fails to disclose expressly using a helical ribbon electrode as the solid state RF plasma source. However, the missing limitation is well known in the art because Flamm discloses that helical resonator is conventionally used in RF plasma generator (See col. 5, line 36-col. 6, line 38). A person of ordinary skill is motivated to use Flamm helical resonator in the process of Li and Pinneo to efficiently control the deposition rate of the species. Besides, it would have been obvious to use ribbon to more easily form the helical shape.

Therefore, at the time of the invention it would have been obvious to combine Li and Pinneo with Flamm to obtain the invention as specified in claims 15, 20 and 30.

10. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pinneo.

Pinneo discloses a plasma excitation circuit using a helical ribbon electrode (See col. 5, line 36-col. 6, line 38).

But it fails to disclose that the circuit is adapted to enhance the plasma uniformity.

However, it would have been obvious for an ordinary artisan to do so by controlling the timing of the deposition gases to obtain more predictable layer thickness.

Double Patenting

11. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or

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improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-4, 7-13, 16-17, and 20 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-10, 12-14, 16, and 19 of U.S. Patent No. 6756318. Although the conflicting claims are not identical, they are not patentably distinct from each other because the main difference between the two sets of claims are the use of a plasma in the instant set of claims. However, it would have been obvious for an ordinary artisan to use plasma to reduce reaction temperature.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ha T. Nguyen whose telephone number is (571) 272-1678. The examiner can normally be reached on Monday-Friday from 8:30AM to 6:00PM, except the first Friday of each bi-week. The telephone number for Wednesday is (703) 560-0528.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael S. Lebentritt, can be reached on (571) 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications

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may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

HN

03- 14 -06



Ha Nguyen

Primary Examiner